Production of Elastin-like Protein Hydrogels for Encapsulation and Immunostaining of Cells in 3D.

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Public Summary:
Two-dimensional (2D) tissue culture techniques have been essential for our understanding of fundamental cell biology. However, traditional 2D tissue culture systems lack a three-dimensional (3D) matrix, resulting in a significant disconnect between results collected in vitro and in vivo. To address this limitation, researchers have engineered 3D hydrogel tissue culture platforms that can mimic the biochemical and biophysical properties of the in vivo cell microenvironment. This research has motivated the need to develop material platforms that support 3D cell encapsulation and downstream biochemical assays. Recombinant protein engineering offers a unique toolset for 3D hydrogel material design and development by allowing for the specific control of protein sequence and therefore, by extension, the potential mechanical and biochemical properties of the resultant matrix. Here, we present a protocol for the expression of recombinantly-derived elastin-like protein (ELP), which can be used to form hydrogels with independently tunable mechanical properties and cell-adhesive ligand concentration. We further present a methodology for cell encapsulation within ELP hydrogels and subsequent immunofluorescent staining of embedded cells for downstream analysis and quantification.

Scientific Abstract:
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